06-26-00

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Express Mail Label No. EL485835579US

# UTILITY PATENT APPLICATION TRANSMITTAL
## (Large Entity)

*(Only for new nonprovisional applications under 37 CFR 1.53(b))*

| Docket No. A-366 |
|---|
| Total Pages in this Submission |

JC860 U.S. PTO 06/23/00

**TO THE ASSISTANT COMMISSIONER FOR PATENTS**
**Box Patent Application**
**Washington, D.C. 20231**

JC830 U.S. PTO 09/602477 06/23/00

Transmitted herewith for filing under 35 U.S.C. 111(a) and 37 C.F.R. 1.53(b) is a new utility patent application for an invention entitled:

**METHOD FOR CORRECTING DEFECTS ON COLOR FILTER**

and invented by:

**Shigeyasu NAKAZAWA et al**

**If a CONTINUATION APPLICATION,** *check appropriate box and supply the requisite information:*

☐ **Continuation** ☐ **Divisional** ☐ **Continuation-in-part (CIP)** of prior application No.: _____

Which is a:

☐ **Continuation** ☐ **Divisional** ☐ **Continuation-in-part (CIP)** of prior application No.: _____

Which is a:

☐ **Continuation** ☐ **Divisional** ☐ **Continuation-in-part (CIP)** of prior application No.: _____

Enclosed are:

**Application Elements**

1. ☐ Filing fee as calculated and transmitted as described below
2. ☒ Specification having **16 (sixteen)** pages and including the following:
   - a. ☒ Descriptive Title of the Invention
   - b. ☐ Cross References to Related Applications *(if applicable)*
   - c. ☐ Statement Regarding Federally-sponsored Research/Development *(if applicable)*
   - d. ☐ Reference to Microfiche Appendix *(if applicable)*
   - e. ☒ Background of the Invention
   - f. ☒ Brief Summary of the Invention
   - g. ☒ Brief Description of the Drawings *(if drawings filed)*
   - h. ☒ Detailed Description
   - i. ☒ Claim(s) as Classified Below
   - j. ☒ Abstract of the Disclosure

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*(Only for new nonprovisional applications under 37 CFR 1.53(b))*

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**Application Elements (Continued)**

3. ☒ Drawing(s) *(when necessary as prescribed by 35 USC 113)*
   a. ☒ Formal Number of Sheets **4 (four)**
   b. ☐ Informal Number of Sheets _____

4. ☒ Oath or Declaration
   a. ☒ Newly executed *(original or copy)* ☐ Unexecuted
   b. ☐ Copy from a prior application (37 CFR 1.63(d)) *(for continuation/divisional application only)*
   c. ☒ With Power of Attorney ☐ Without Power of Attorney
   d. ☐ *DELETION OF INVENTOR(S)*
   Signed statement attached deleting inventor(s) named in the prior application, see 37 C.F.R. 1.63(d)(2) and 1.33(b).

5. ☐ Incorporation By Reference *(usable if Box 4b is checked)*
   The entire disclosure of the prior application, from which a copy of the oath or declaration is supplied under Box 4b, is considered as being part of the disclosure of the accompanying application and is hereby incorporated by reference therein.

6. ☐ Computer Program in Microfiche *(Appendix)*

7. ☐ Nucleotide and/or Amino Acid Sequence Submission *(if applicable, all must be included)*
   a. ☐ Paper Copy
   b. ☐ Computer Readable Copy *(identical to computer copy)*
   c. ☐ Statement Verifying Identical Paper and Computer Readable Copy

**Accompanying Application Parts**

8. ☒ Assignment Papers *(cover sheet & document(s))*

9. ☐ 37 CFR 3.73(B) Statement *(when there is an assignee)*

10. ☐ English Translation Document *(if applicable)*

11. ☐ Information Disclosure Statement/PTO-1449 ☐ Copies of IDS Citations

12. ☐ Preliminary Amendment

13. ☒ Acknowledgment postcard

14. ☒ Certificate of Mailing
   ☐ First Class ☒ Express Mail *(Specify Label No.):* **EL485835579US**

# UTILITY PATENT APPLICATION TRANSMITTAL
## (Large Entity)

*(Only for new nonprovisional applications under 37 CFR 1.53(b))*

| Docket No. |
|---|
| A-366 |
| Total Pages in this Submission |

**Accompanying Application Parts (Continued)**

15. ☐ Certified Copy of Priority Document(s) *(if foreign priority is claimed)*

16. ☒ Additional Enclosures *(please identify below):*

**Inventor Information Sheet (Patent Bibliographical Data)**

**Fee Calculation and Transmittal**

**CLAIMS AS FILED**

| For | #Filed | #Allowed | #Extra | | Rate | Fee |
|---|---|---|---|---|---|---|
| Total Claims | 5 | - 20 = | 0 | x | $18.00 | $0.00 |
| Indep. Claims | 2 | - 3 = | 0 | x | $78.00 | $0.00 |
| Multiple Dependent Claims (check if applicable) ☒ | | | | | | $260.00 |
| | | | | | BASIC FEE | $760.00 |
| OTHER FEE *(specify purpose)* Assignment Recordation Fee | | | | | | $40.00 |
| | | | | | TOTAL FILING FEE | $1,060.00 |

☒ A check in the amount of **$40.00** to cover the ~~filing~~ recordal fee is enclosed.

☐ The Commissioner is hereby authorized to charge and credit Deposit Account No. as described below. A duplicate copy of this sheet is enclosed.

- ☐ Charge the amount of as filing fee.
- ☐ Credit any overpayment.
- ☐ Charge any additional filing fees required under 37 C.F.R. 1.16 and 1.17.
- ☐ Charge the issue fee set in 37 C.F.R. 1.18 at the mailing of the Notice of Allowance, pursuant to 37 C.F.R. 1.311(b).

Dated: **June 23, 2000**

*Signature*

**James H. Walters, Reg. No. 35,731**
**DELLETT AND WALTERS**
**310 S.W. Fourth Avenue, Suite 1101**
**Portland, Oregon 97204**
**(503) 224-0115**

cc:

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CORRESPONDENCE INFORMATION

Correspondence Customer Number:: 802
Electronic Mail One:: jwalters@teleport.com

APPLICATION INFORMATION

Title Line One:: METHOD FOR CORRECTING DEFECTS ON COLOR F
Title Line Two:: ILTER
Total Drawing Sheets:: 4
Formal Drawings?:: Yes
Application Type:: Utility
Docket Number:: A-366
Secrecy Order in Parent Appl.?:: No

REPRESENTATIVE INFORMATION

Representative Customer Number:: 802
Registration Number One:: 35731

PRIOR FOREIGN APPLICATIONS

Foreign Application One:: 11-179232
Filing Date:: 06-25-1999
Country:: JAPAN
Priority Claimed:: Yes
Foreign Application Two:: 2000-159793
Filing Date:: 05-30-2000

Express Mail #EL485835579US

Country:: JAPAN
Priority Claimed:: Yes

Source:: PrintEFS Version 1.0

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of

Shigeyasu NAKAZAWA et al

S. N.

Filed:

For: METHOD FOR CORRECTING DEFECTS ON COLOR FILTER

PRELIMINARY AMENDMENT

Assistant Commissioner for Patents
Washington, D.C. 20231

Sir:

Please make the following amendments to this application prior to examination thereof:

In the Specification:

Page 5, line 9, delete "Fig. 3 represents" and substitute --Figs. 3 (A) — 3 (C) represent--;

line 11, delete "Fig. 4 represents" and substitute --Figs. 4 (A) — 4 (D) represent--;

line 13, delete "Fig. 5 represents" and substitute --Figs. 5 (A) — 5 (C) represent--.

REMARKS

The above amendments are submitted to place the application into a format consistent with U.S. practice.

Respectfully submitted,

James H. Walters, Reg. No. 35,731

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# METHOD FOR CORRECTING DEFECTS ON COLOR FILTER

## BACKGROUND OF THE INVENTION

The present invention relates to a method for correcting protruding defects or white or black defects on a color filter, which occur during a process to manufacture a color filter for liquid crystal display apparatus.

Referring to Fig. 6, description will be given below on an example of a method for manufacturing a color filter. On a transparent substrate 2 such as a glass plate, a light-shielding layer BM comprising striped pattern with line width of 20 μm, pitch of 80 μm, and film thickness of about 0.5 μm is formed by screen printing. Next, on the light-shielding layer, a red colorant sensitive material R is coated. Then, a photo mask is placed and light exposure is performed. Next, a green pattern layer and a blue pattern layer are formed by the same procedure. Both longitudinal sides of each color pattern layer are overlapped on the light-shielding layer BM for a length of about 10 μm, and the film thickness is about 2 μm. Next, with the purpose of achieving physico-chemical protection, and of evenly adjusting and flattening the surface, a photo-curing resin is coated on the color pattern layer, and a protective film layer OP is formed in film thickness of about 2 - 3 μm. Further, a film of indium tin oxide (ITO) is formed on the protective layer by vacuum film forming method, and electrode pattern is fabricated by mask deposition method, etching method, etc., and a transparent

electrode layer is formed to prepare a color filter.

In the process to manufacture the color filter as described above, foreign objects "a" such as dust are intermingled in the coating process to coat color sensitive material as shown in Fig. 6. If these objects remain on the color pattern layers R, G or B or foreign objects such as dust are attached on the surface of the color pattern layer, protruding defects "b" may be formed on the portions corresponding to the foreign objects such as dust when the protective layer OP is formed on the color pattern layer. Also, when dust is attached on the photomask, white defects "c" may occur on the color pattern layer or black defects may be generated on the light-shielding layer BM. Such defects may impair orientation of liquid crystals in liquid crystal cells, which are provided on the surface of the color filter, or may lead to defects in the images taken or displayed, and the products produced using the color filter may become defective. In the past, as described in JP-A-3-274504 or JP-A-9-184910, methods have been proposed to coat a colorant sensitive material after cutting the defective portion off and to remove it using the laser beam in order to correct the above defects.

## SUMMARY OF THE INVENTION

However, according to the conventional method for correcting defects as described above, it is difficult to fill ink to corners when the corrective ink is dropped to the upper surface because almost the entire region of

picture element is cut in rectangular shape, and void patches or unevenly colored portions are likely to occur. Also, the quantity of the colorant to be removed is higher than the case when only the portion near the defects are cut off. As a result, colorant materials are splashed to the surrounding regions, and these may cause new defects. Further, in case the hue of the corrective ink is different by approximately one picture element from the hue of colorant picture element, defects are very likely to occur due to color difference. As a result, the percentage of acceptable products after correction may be low.

To solve the above problems, it is an object of the present invention to provide a method for correcting defects on a color filter, by which it is possible to correct all of protruding defects, white defects and black defects, which are generated in the process to manufacture color filter and to extensively improve the percentage of high quality products.

To attain the above object, the invention of claim 1 provides a method for correcting defects on a color filter, which comprises the steps of setting a diameter of a laser beam in a circular correcting region including defective portion, or more preferably, in a circular correcting region comprising a circle which circumscribes the defective portion in order to ensure better permeation of liquid and better diffusion, and to prevent uneven coloring due to insufficient flow of the liquid when the defective portion on the color filter is removed by irradiation of

the laser beam, dropping a corrective ink to upper surface of the circular correcting region by an ink jet unit so that the ink is formed in spherical shape after the circular correcting region has been removed, and hardening and shrinking the corrective ink by an ink hardener thereafter so that variation of film thickness in the circular correcting region can be controlled within 0.1 μm.

The invention according to claim 2 provides a method for correcting defects on a color filter, said method comprising the step of setting a diameter of a laser beam on a circular correcting region including defective portion when the defective portion on the color filter is removed by irradiation of the laser beam, and depositing a metal film of more than 1000 angstrom in thickness by laser CVD method on the circular correcting region after the circular correcting region has been removed so that back light can be completely shielded.

According to the present invention, it is possible to easily correct all of protruding defects, white defects and black defects caused in the process for manufacturing the color filter, and also to extensively improve the percentage of high quality products. Further, according to the invention of claim 1, ink can be dropped by selecting ink color depending on the defective region by the ink jet unit. For example, in case the correcting region is a green pattern layer, a green corrective ink can be dropped. As a result, defects on the green pattern portion can be easily corrected without resulting in uneven

coloring.

## BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a block diagram to explain an example of a method for correcting defects on a color filter according to the present invention;

Fig. 2 is a drawing to explain setting of a diameter of laser beam in the arrangement shown in Fig. 1;

Fig. 3 represents drawings to explain Example 1 shown in Fig. 1;

Fig. 4 represents drawings to explain Example 2 shown in Fig. 1;

Fig. 5 represents drawings to explain a comparative example shown in Fig. 1; and

Fig. 6 is an enlarged sectional view to explain a defect on a color filter.

## DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Description will be given below on embodiments of the present invention referring to the drawings. Fig. 1 is a block diagram to explain an example of a method for correcting defects on a color filter according to the present invention.

In Fig. 1, a substrate 2, which has a color pattern layer as described above formed on it, is placed on an XY$\theta$ stage (substrate moving stage) 1. This XY$\theta$ stage can be moved along XY plane and at a tilt angle $\theta$ by a driving mechanism 3. A defect detecting unit 4 is a device for

checking defects on a color filter as described above. A CCD camera 5 takes an image of the substrate 2 via an objective lens 6, a semitransparent mirror 7 and an image forming lens 8. The data of the image thus taken is sent to an image processing unit 9, where the data is binarized with a preset threshold, and a defective portion on the substrate 2 is extracted. The extracted defect information is displayed on a display 10 for confirmation, and it is sent to an arithmetic unit 11.

A laser irradiation unit 12 irradiates a laser beam to the defective portion detected by the defect detecting unit and it is used to remove substances which are present within that region. The laser beam is emitted from a UV laser oscillator 13 (YAG laser) with output of 15 mj or more (wavelength: 1067 nm) or with output of 2 mj or more (wavelength: 533.5 nm), and irradiation energy density of the laser beam is increased or decreased by a density adjuster 14. The diameter of the laser beam is enlarged by a diameter enlarger 15, and intensity of the laser beam is equalized, and it enters an opening adjuster 17 via a mirror 16. The opening adjuster 17 is provided with a plurality of moving plates around the opening. By moving the moving plates using a driving mechanism 18, the diameter of the opening is adjusted, and the diameter of the laser beam can be adjusted to the value as desired. That is, as shown in Fig. 2, when a defective portion D is picked up on a picture element I of a CCD camera, a diameter "r" of the laser beam is set within a circular

correcting region M, which comprises a circle circumscribing the defective portion D, and its center is used as a position information of the defective portion D. The circular correcting region M may be a circle, which includes the defective portion D. The diameter "r" can be changed within the range of 50 to 150 $\mu$m. After the diameter of the laser beam has been adjusted to a desired value by the opening adjuster 17, the laser beam is protruding to the substrate 2 positioned on the XY$\theta$ stage 1 via a mirror 19, an image forming lens 20, the semitransparent mirror 7 and the objective lens 6.

A defect correcting unit 21 is a device to place and fill a pattern layer into a portion, from where the substances have been removed by the laser irradiating unit 12, and it is provided with an ink discharge unit 22, a driving circuit 23 for driving the ink discharge unit and an ink hardener 24. As the ink discharge unit 22, a dispenser or an ink jet device may be used. As the method for discharging from the dispenser, a continuous discharge method for continuously discharging the ink or an intermittent discharge method for intermittently discharging the ink after ink drops are prepared may be used. As the ink jet unit, there are two types: continuous type and on-demand type. The former is to apply an electric field while ink is continuously injected, and ink is collected on a capture dish so that ink is not coated on the substrate of the color filter. According to the latter, the color filter substrate is moved, and ink

discharge is turned on or off, depending on the position of the substrate. As the ink discharge unit 22 as described above, it is preferable to use an ink jet unit. Other methods are that corrective inks can also be dropped by laser thermo-fusible transfer method, needle painting method, and so on. In the following, description will be given by taking an example on the ink jet unit.

The ink jet unit 22 is a device to drop corrective ink in four colors of red, green, blue and black. The corrective ink is preferably an ink made of thermo-curing resin or UV-curing resin with higher surface tension. The ink hardener 24 comprises a heating block or a UV-irradiation spot light source. It is designed in such manner that the ink jet unit 22 and the ink hardener 24 can be moved toward the substrate 2 by a lift mechanism (not shown).

The arithmetic unit 11 transmits an information, which indicates shape of the defective portion and its position to the driving mechanism 18, and drives the opening adjuster 17 to change the diameter of the laser beam. At the same time, it drives the XY$\theta$ stage 1 and determines irradiating position of the laser beam. Also, it transmits signals to the UV laser oscillator 13 and the density adjuster 14 and controls irradiation time, number or times of irradiation, and irradiation energy density. Signals of ink color and ink drop quantity are sent to the driving circuit 23, and the ink jet unit 22 is controlled.

Next, description will be given on Examples 1 and 2

and comparative example of this embodiment. First, Example 1 will be described referring to Fig. 3.

Fig. 3 (A) shows a condition where the circular correcting region M including the defective portion of a green pattern layer G is removed by the laser beam. In this example, line width of a light-shielding layer BM is 20 μm, BM spacing is 80 μm, film thickness of a colored layer RGB is 1.4 μm, and diameter of the circular correcting region M is 55 μm. Next, green corrective ink G' is dropped to the circular correcting region M by the ink jet unit 22 as shown in Fig. 3 (B). As the green corrective ink G', thermo-curing resin or UV-curing resin is used.

- The following materials were used as the thermo-curing resin:

  Binder resin: Copolymer of benzyl methacrylate and glycidyl methacrylate

  Multifunctional epoxy resin: Cresol novolak type epoxy resin

  Polyvalent carboxylic acid: Trimellitic acid

  Solvent: Propylene glycol monomethylether acetate

  G pigment: C.I.No. Pigment Green 36

  Y pigment: C.I.No. Pigment Yellow 150

  Dispersant: Solsperse 24000 (manufactured by Avicia)

- A pigment dispersion composition having the following components was used as UV-curing resin:

Binder resin: Copolymer of methacrylic acid and benzyl methacrylate

Multifunctional monomer: Trimethylolpropane triacrylate

Photopolymerization initiator: Irgacure 907 (manufactured by Ciba Specialty Chemicals)

Solvent: Ethoxyethyl propionate

G pigment: C.I.No. Pigment Green 36

Y pigment: C.I.No. Pigment Yellow 150

Dispersant: Solsperse 24000 (manufactured by Avicia)

Discharge quantity (volume) of this ink was 4 drops at the rate of 20 PI/drop. That is, ink drops of 80 PI were dropped so that the ink is formed in spherical shape on upper surface of the circular correcting region (Fig. 3 (B)). Finally, when the corrective ink G' was hardened using the ink hardener 24, the corrective ink G' was shrunk as shown in Fig. 3 (C), and the circular correcting region M was filled and corrected to be flush. Thus, it is possible to equalize variation in film thickness to 0.1 μm, and unevenness of color can also be corrected almost to the level suitable for practical use.

In case of thermo-curing resin, when the corrective ink G' is hardened, baking was performed at 220℃ for 10 minutes on the heating block. By this heating, the spherically swollen form of ink by 5 μm higher than the upper surface of the surrounding portion after ink dropping

was reduced to a form of a concave lens by 0.05$\mu$m lower than the upper surface of the surrounding portion. In case of UV-curing resin, ultraviolet ray was irradiated by spot irradiation of 1000 mj/cm$^2$, and baking was performed at 200°C for 30 minutes on the heating block. By this heating, the spherically swollen form of ink by 5 $\mu$m higher than the upper surface of the surrounding portion was turned to a form of a convex lens which was by 0.09 $\mu$m higher than the upper surface of the surrounding portion.

Next, Example 2 will be described referring to Fig. 4. Fig. 4 (A) shows a red pattern layer R. A protruding defective portion D is present where the size of picture element is 100 x 300 $\mu$m, and film thickness is 1 $\mu$m. Fig. 4 (B) shows a condition where the circular correcting region M including the defective portion D is removed by the laser beam. Diameter of the circular correcting region M is 60 $\mu$m. Next, red corrective ink R' is dropped to the circular correcting region M by the ink jet unit 22 as shown in Fig. 4 (C). As the red corrective ink R', thermo-curing resin is used.

- The following substances were used as the thermo-curing resin:

  Binder resin: Copolymer of benzyl methacrylate and glycidyl methacrylate

  Multifunctional epoxy resin:

  Cresol novolak type epoxy resin

  Polyvalent carboxylic acid:

  Trimellitic acid

| | |
|---|---|
| Solvent: | Propylene glycol monomethylether acetate |
| R pigment: | C.I.No. Pigment Red 254 |
| Y pigment: | C.I.No. Pigment Yellow 139 |
| Dispersant: | Solsperse 24000 (manufactured by Avicia) |

Discharge quantity (volume) of this ink was 4 drops at the rate of 20 PI/drop. That is, ink drops of 80 PI were dropped, and the ink was turned to a spherically swollen form by 5 μm higher than the upper surface of the circular correcting region M (Fig. 4 (C)). Finally, baking was performed at 220°C for 10 minutes on the heating block. By this heating, a spherically swollen portion by 5 μm higher than the upper surface of the surrounding portion formed after dropping of the ink was turned to a form of a concave lens by 0.9 μm lower than the upper surface of the surrounding portion (Fig. 4 (D)). Because the corrective ink having the same hue as the red pattern layer R was filled, there was almost no difference of color on the corrected portion.

Next, the comparative example will be described referring to Fig. 5. In the same manner as in Example 2 shown in Fig. 4 (A), correction was carried out on the red pattern layer R where a protruding defective portion D was present with size of the picture element 100 x 300 μm and film thickness of 1 μm. As shown in Fig. 5 (A), a mask with rectangular opening was placed, and a correcting region M' including the defective portion D was removed by

the laser beam. The size of the portion to be removed was 100 x 300 μm, and this approximately corresponded to one picture element. Next, to the correcting region M' of the portion to be removed, a red corrective ink R' which was the same corrective ink as in Example 2 was dropped by the same procedure as in Example 2. As shown in Fig. 5 (B), a portion not filled with ink (ink-lacking portion) X was generated at each of four corners of the rectangular correcting region M'. Next, when baking was carried out by the same procedure as in Example 2, a void portion C or unevenly colored portion C' due to insufficient film thickness was found as shown in Fig. 5 (C).

Next, description will be given on another embodiment of the present invention. In the above embodiment, the defect correcting unit 21 comprises an ink jet unit 22, a driving circuit 23, and an ink hardener 24. In the present embodiment, however, instead of the defect correcting unit, a device based on the laser CVD method is used, and a metal film of light-shielding film BM, which has chromium or tungsten as the main components such as $Cr(CO)_6$, $W(CO)_6$, is deposited by vacuum evaporation in thickness of 1000 angstrom or more. According to this method, similarly to the case of the defect correcting unit 21, the substances in the circular correcting region M detected by the information transmitted from the arithmetic unit 11 are removed, and the metal film of the light-shielding film BM is deposited on the circular correcting region M. As a result, back light can be completely

shielded. Even when the circular correcting region is a color pattern layer, the metal film of the light-shielding film BM is deposited. No problem occurs in the produced color filter, and not only black defects but also protruding defects or white defects on the color pattern layer can be corrected. When the device based on the laser CVD method is used, the thickness of the metal film to be deposited can be adjusted, and it is possible to form a color pattern layer with no variation in film thickness.

WHAT IS CLAIMED IS:

1. A method for correcting defects on a color filter, comprising the steps of setting a diameter of a laser beam on a circular correcting region including a defective portion when the defective portion of a color filter is removed by irradiation of the laser beam, dropping a corrective ink to upper surface of the circular correcting region by an ink jet unit after the circular correcting region has been removed, and hardening and shrinking the corrective ink by an ink hardener thereafter.

2. A method for correcting defects on a color filter, comprising the steps of setting a diameter of a laser beam on a circular correcting region including a defective portion when the defective portion of a color filter is removed by irradiation of the laser beam, and depositing a metal film by laser CVD method to the circular correcting region after the circular correcting region has been removed.

3. A method for correcting defects on a color filter according to claim 2, wherein the metal film to be deposited by the laser CVD method contains chromium or tungsten as main components.

4. A method for correcting defects on a color filter according to claim 2 or 3, wherein the defective portion to be removed by irradiation of the laser beam is a black defect.

## ABSTRACT OF THE DISCLOSURE

The present invention provides a method for correcting defects on a color filter with the purpose of correcting defects caused in a process to manufacture the color filter and of extensively improving the percentage of high quality products, and the method comprises the steps of setting a diameter of a laser beam on a circular correcting region M when the defects on the color filter are removed by irradiation of the laser beam, dropping a corrective ink G' to upper surface of the circular correcting region by an ink jet unit after the circular correcting region has been removed, and hardening and shrinking the corrective ink by an ink hardener thereafter.

FIG. 1

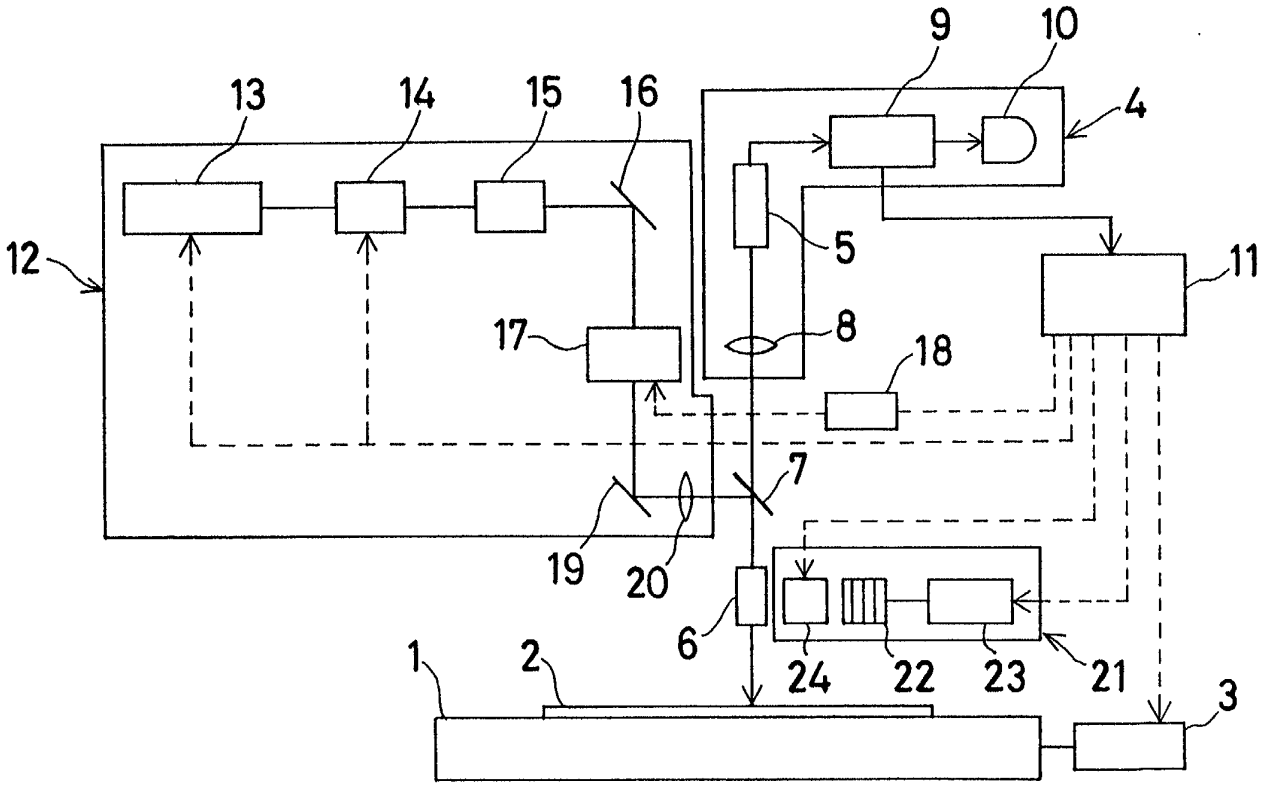


FIG. 2

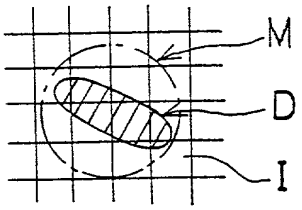



FIG. 3(A)

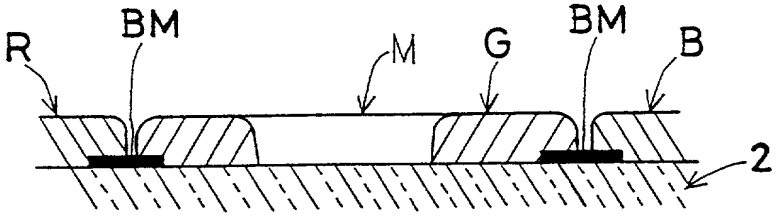



FIG. 3(B)

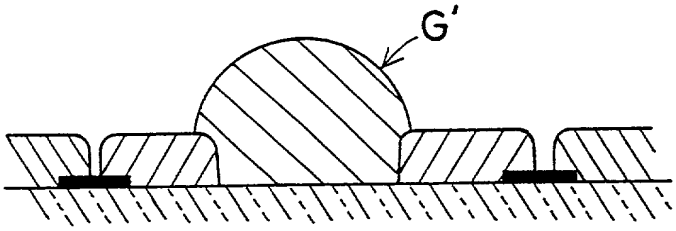



FIG. 3(C)

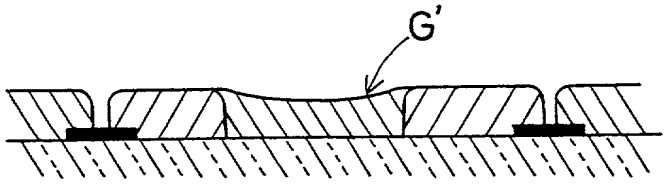


FIG. 4(A)

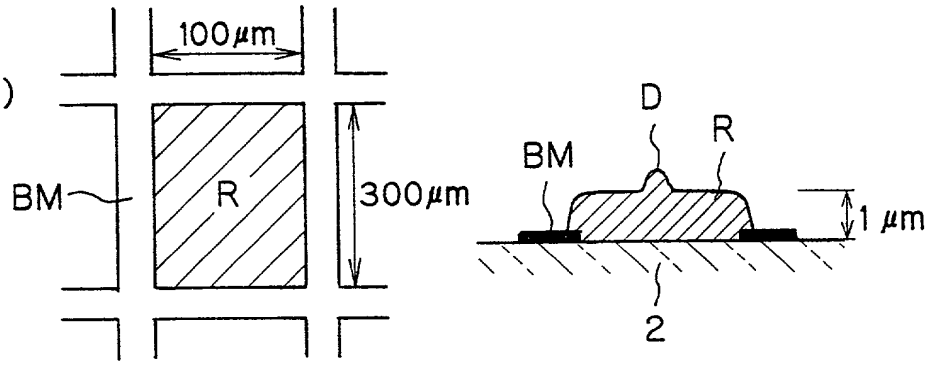



FIG. 4(B)

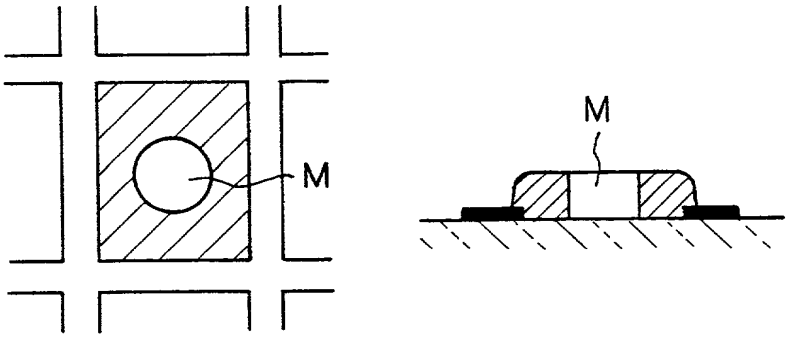



FIG. 4(C)

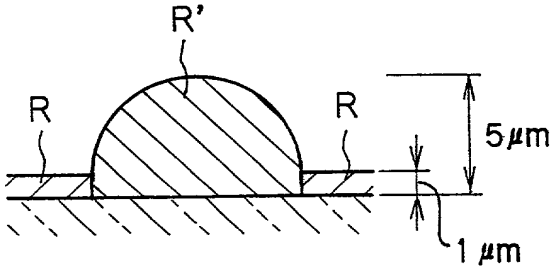



FIG. 4(D)

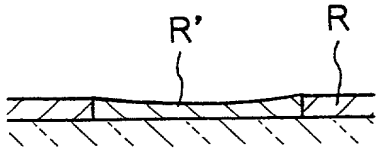


FIG. 5(A)

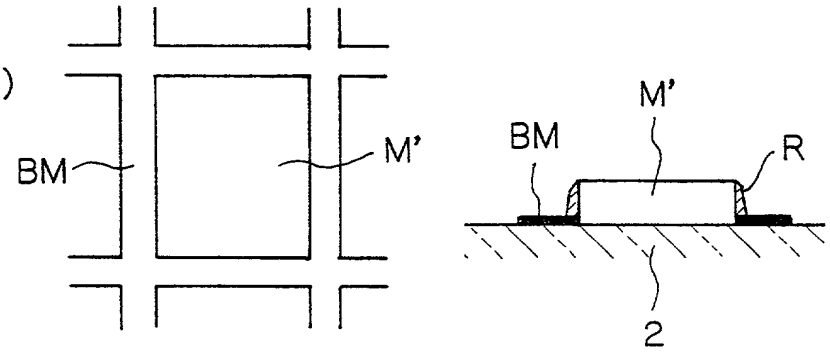



FIG. 5(B)

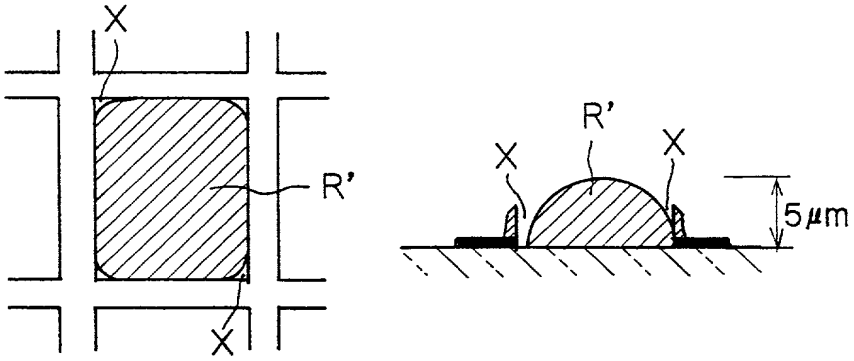



FIG. 5(C)

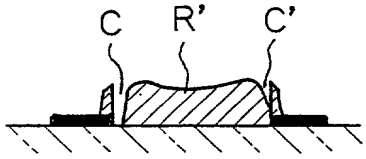
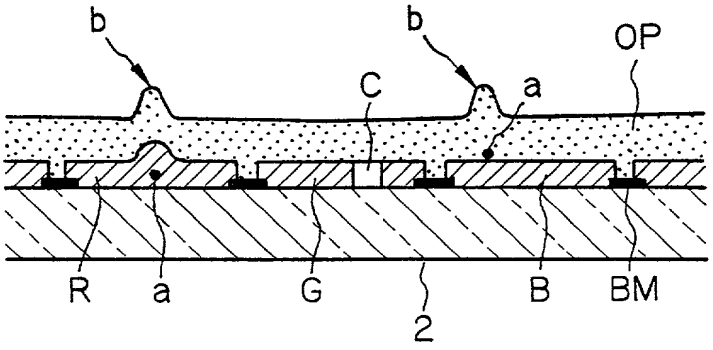



FIG. 6



Attorney's Docket No. A-366

# COMBINED DECLARATION AND POWER OF ATTORNEY (ORIGINAL APPLICATION)

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name, I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

METHOD FOR CORRECTING DEFECTS ON COLOR FILTER

the specification of which is attached hereto unless box (a) or (b) is checked, in which case

(a) [ ] the specification was filed on _____ as Application Serial No. _____.

(b) [ ] the specification was filed as PCT International Application No. _____ filed on _____ and was amended under PCT Art. 19 on _____ (if any).

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose to the Patent and Trademark Office all information known to me to be material to patentability as defined in Title 37, Code of Federal Regulations, sec. 1.56.

I have identified below any foreign application(s) for patent or inventor's certificate or any PCT international application(s) designating at least one country other than the United States of America and filed less than 12 months (6 months for designs) prior to this United States application and of which I claim foreign priority benefits under Title 35, United States Code, sec. 119, and I have also identified below any foreign application(s) for patent or inventor's certificate or any PCT international application(s) designating at least one country other than the United States of America filed by me on the same subject matter having a filing date before that of the application(s) of which priority is claimed.

EARLIEST FOREIGN APPLICATION, AND ALL FOREIGN APPLICATIONS FILED MORE THAN 12 MONTHS (6 MONTHS FOR DESIGN) PRIOR TO THIS U. S. APPLICATION

| Country | Application No. | Date of Filing (Month/day/year) |
|---|---|---|
| Japan | 11-179232 | 06/25/99 |
| Japan | 2000-159793 | 05/30/00 |
| | | |



Express Mail #EL485235579US

As a named inventor, I hereby appoint the following attorneys to prosecute this application and transact all business in the Patent and Trademark Office connected therewith and in connection with the resulting patent:

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I authorize the attorneys that I have appointed to accept instructions regarding this application and the resulting patent from Azusa Patent Office.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both under Title 18, United States Code, sec. 1001, and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Full name of **sole or first joint inventor** Shigeyasu NAKAZAWA

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# United States Patent & Trademark Office

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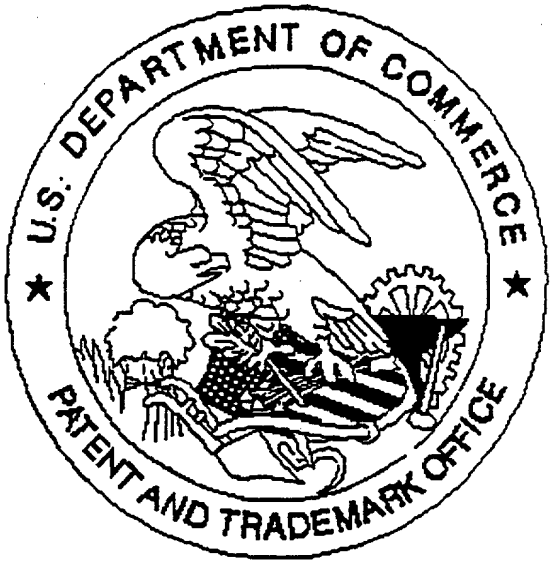


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Specification